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EXPERIENCE OF EASTERN FARMERS WITH MOTOR TRUCKS

AN ANALYSIS OF 753 REPORTS FROM FARMER TRUCK-OWNERS

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½-ton trucks, 34 cents with the ¾-ton, 26 cents with the 1-ton, 24 cents with the 1¼-ton and 1½-ton, and 18 cents with the 2-ton trucks.

About four-fifths of these men state that their trucks save hired help. On the average they estimate that this saving amounts to $324 per year.

About half the men have decreased the number of work stock by at least one head since purchasing their trucks. Less than one man in ten had disposed of more than two head, however.

Over half of the men whose farms contain more than 120 crop-acres own tractors. The number of work stock kept on the farms where both trucks and tractors are owned is only slightly less than the number kept on the farms of corresponding size where only trucks are owned.

METHOD OF STUDY.

In December, 1919, the crop reporters of the Bureau of Crop Estimates were asked to report the names and addresses of farmers who owned motor trucks for farm use. Nine thousand six hundred and fifty-nine names and addresses of farmers in the 11 States included in the study were received, and to each was sent a questionnaire on which to report the type and size of his farm, the use he makes of his motor truck, the cost of operating it, his idea of its profitableness, the advantages and disadvantages of a truck for farm use, and other related information. In all, 2,314, about 24 per cent of the farmers queried, replied to the questionnaire.

However, no reports from men owning second-hand trucks nor trucks made by the addition of truck units or attachments to passenger cars, were included in the study. Twenty-seven per cent of the reports were on machines of these classes. About 10 per cent of the reports were from men who had owned their trucks only six months or less, and they were also excluded. Another 30 per cent of the reports were excluded for other reasons. Some were from farmers who are using their trucks primarily for custom work, or in connection with other business, and only incidentally for farm work; some were from men who had sold their trucks; and a few of the reports were not filled out in sufficient detail to make their use worth while. The questionnaire called for information on over 150 items.

LOCATION OF FARMS AND TYPES OF FARMING.

The number of reports tabulated from each State follows:

Maine	11	New York	241
New Hampshire	11	New Jersey	92
Vermont	16	Pennsylvania	235
Massachusetts	63	Delaware	11
Rhode Island	16	Maryland	40
Connecticut	17		

These farms are of all sizes and types, varying from truck farms of only a few acres to large crop farms containing several hundred acres. The types of farming practiced have been classified into five groups, as follows:

(1) Truck farms, on which the raising of vegetables and similar produce predominates.

(2) Dairy farms, on which dairying is the principal enterprise.

(3) Fruit farms.

(4) Crop farms, on which general field crops are raised, but few or no dairy cows are kept, and no live stock is raised for sale.

(5) General farms, where no one special enterprise predominates.

In the region studied there are many more general farms than any other type. Although more reports were received from men who operate general farms than from any other class, this does not necessarily mean that the percentage of such farmers who own motor trucks is larger than that of men who follow special types of farming.

The number of farms of the different types and their average size are shown in Table I.

TABLE I.—*Number of farms of different types, and their acreages.*

Type of farm.	Number.	Average size.
		Acres.
Truck	149	64
Dairy	129	234
Fruit	113	111
Crop	48	237
General	314	210
All	753	173

DISTANCE TO MARKET.

Probably the most striking point concerning these farms is their great distance from market as compared with other farms in the same section. Only 18 per cent of these farms are less than 5 miles from market, while nearly one-fourth of them are 20 miles or more. As will appear later, some of the men who have very long hauls have changed their markets since purchasing their trucks, but the average distance from market, even before the purchase of the trucks, was a little over 10 miles. (See fig. 1.)

Seven hundred and four men reported the distance to the towns where the materials hauled by trucks are usually marketed. The exact number of farms of different types at different distances from market is as follows:

Of 143 truck farms—

11 are less than 5 miles from market.

32 are from 5 to 9 miles from market.

34 are from 10 to 14 miles from market.

Of 143 truck farms—Continued.

33 are from 15 to 19 miles from market.
17 are from 20 to 24 miles from market.
9 are from 25 to 29 miles from market.
7 are 30 miles and over from market.

Of 117 dairy farms—

48 are less than 5 miles from market.
45 are from 5 to 9 miles from market.
8 are from 10 to 14 miles from market.
2 are from 15 to 19 miles from market.
7 are from 20 to 24 miles from market.
4 are from 25 to 29 miles from market.
3 are 30 miles and over from market.

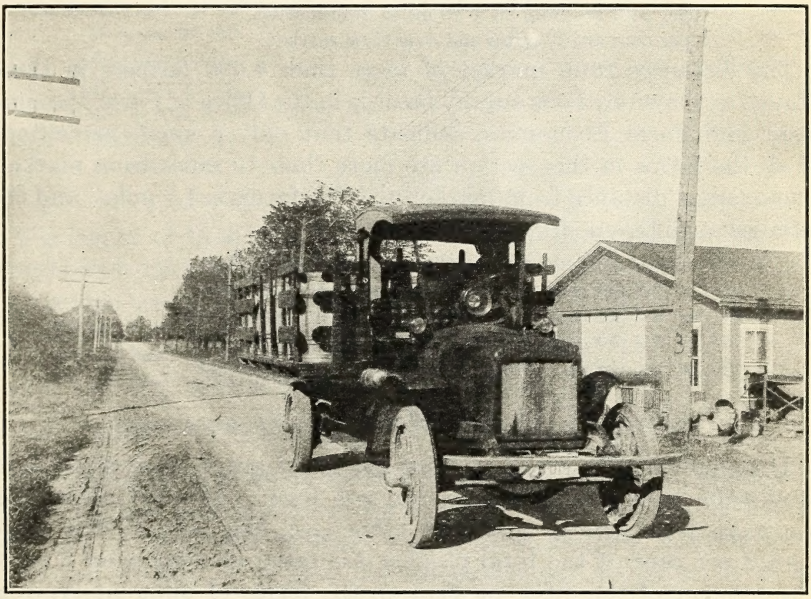

FIG. 1.—If a farmer is located on an improved road, such as is illustrated here, a motor truck will enable him to reach a distant market in a short time practically any day in the year.

Of 98 fruit farms—

18 are less than 5 miles from market.
21 are from 5 to 9 miles from market.
16 are from 10 to 14 miles from market.
10 are from 15 to 19 miles from market.
9 are from 20 to 24 miles from market.
9 are from 25 to 29 miles from market.
15 are 30 miles and over from market.

Of 44 crop farms—

11 are less than 5 miles from market.
15 are from 5 to 9 miles from market.
4 are from 10 to 14 miles from market.
4 are from 15 to 19 miles from market.
4 are from 20 to 24 miles from market.
1 is from 25 to 29 miles from market.
5 are 30 miles and over from market.

Of 302 general farms—

36 are less than 5 miles from market.
67 are from 5 to 9 miles from market.
68 are from 10 to 14 miles from market.
57 are from 15 to 19 miles from market.
22 are from 20 to 24 miles from market.
23 are from 25 to 29 miles from market.
29 are 30 miles and over from market.

Of all the 704 farms—

18 per cent are less than 5 miles from market.
25 per cent are from 5 to 9 miles from market.
19 per cent are from 10 to 14 miles from market.
15 per cent are from 15 to 19 miles from market.
8 per cent are from 20 to 24 miles from market.
7 per cent are from 25 to 29 miles from market.
8 per cent are 30 miles and over from market.

The distances from market of more than 4,000 farmers in these States, as shown by farm survey records in the Office of Farm Management and Farm Economics, indicate that only a small percentage of all the farms in this section are more than 10 miles from market. The average distance from market of 4,271 farms is 4.1 miles, and the number at different distances is as follows:

2,936, or 68.7 per cent, are less than 5 miles from market.
1,018, or 23.8 per cent, are from 5 to 9 miles from market.
241, or 5.7 per cent, are from 10 to 14 miles from market.
51, or 1.2 per cent, are from 15 to 19 miles from market
25, or 0.6 per cent, are 20 miles and over from market

SIZE OF TRUCK.

The motor trucks owned on these 753 farms are of many sizes, their rated capacities running from ½ ton to 5 tons. However, these men use more 1-ton trucks than any other size, and only a little more than 2 per cent of the total number are rated at more than 2 tons. The number of the different sizes on the farms of different types is as follows:

On the 149 truck farms, there are—

24 ½-ton trucks.
18 ¾-ton trucks.
59 1-ton trucks.
19 1¼- and 1½-ton trucks.
22 2-ton trucks.
7 over 2 tons.

On the 129 dairy farms, there are—

43 ½-ton trucks.
14 ¾-ton trucks.
62 1-ton trucks.
4 1¼- and 1½-ton trucks.
4 2-ton trucks.
2 over 2 tons.

On the 113 fruit farms, there are—

17 ½-ton trucks.
17 ¾-ton trucks.
48 1-ton trucks.
11 1¼- and 1½-ton trucks.
18 2-ton trucks.
2 over 2 tons.

On the 48 crop farms, there are—

1 ½-ton truck.
5 ¾-ton trucks.
19 1-ton trucks.
11 1¼- and 1½-ton trucks.
11 2-ton trucks.
1 over 2 tons.

On the 314 general farms, there are—

65 ½-ton trucks.
41 ¾-ton trucks.
156 1-ton trucks.
22 1¼- and 1½-ton trucks.
24 2-ton trucks.
6 over 2 tons

AGE OF TRUCKS.

The length of time the 753 trucks had been in use at the time the reports were made is as follows:

201 had been in use 7 to 12 months.
269 had been in use 13 to 24 months.
164 had been in use 25 to 36 months.
119 had been in use 37 months or over.

ARE THESE TRUCKS PROFITABLE INVESTMENTS?

No attempt was made to determine to what extent the incomes of these men had been increased through the use of the trucks, but 95 per cent of the total number stated that in their opinion their machines bid fair to be profitable investments. So far as could be determined, the size of the truck, the type of farming practiced, and length of time the machine had been owned had little to do with the owner's idea of its profitableness. Some of those who did not consider that their motor trucks had been profitable were men who had found them unreliable, as they were often out of commission when needed, or their repair bills had been exceptionally high. Others had found that they did not have enough work for the truck to justify the investment in such an expensive piece of equipment.

THE BEST SIZE.

The fact that most of these men consider their motor trucks profitable investments does not mean, however, that they are all entirely satisfied with the particular machines which they own. It is very important that the truck should be of the proper size for the hauling

which it is to do. Ordinarily both the first cost and the cost of operation of a small truck will be less than of a large one, but often the small truck will not carry as large loads as is desired, and more trips to haul a given amount of material will therefore be necessary than with a larger truck. A truck which is too large, however, would have to be operated with only a partial load a great part of the time, and the extra cost would more than offset the advantage of being able to carry larger loads on exceptional occasions.

Each farmer was asked to state what size he considers the best for his conditions, regardless of the size he now owns, and 696 men answered as follows:

Of 131 who now own ½-ton trucks—
- 47 consider that the best size is ½-ton.
- 14 consider that the best size is ¾-ton.
- 56 consider that the best size is 1-ton.
- 9 consider that the best size is 1¼- or 1½-ton.
- 4 consider that the best size is 2-ton.
- 1 considers that the best size is over 2-ton.

Of 83 who now own ¾-ton trucks—
- 1 considers that the best size is ½-ton.
- 46 consider that the best size is ¾-ton.
- 28 consider that the best size is 1-ton.
- 6 consider that the best size is 1¼- or 1½-ton.
- 1 considers that the best size is 2-ton.
- 1 considers that the best size is over 2-ton.

Of 329 who now own 1-ton trucks—
- 2 consider that the best size is ¾-ton.
- 242 consider that the best size is 1-ton.
- 54 consider that the best size is 1¼- or 1½-ton.
- 30 consider that the best size is 2-ton.
- 1 considers that the best size is over 2-ton.

Of 63 who now own 1¼- and 1½-ton trucks—
- 2 consider that the best size is 1-ton.
- 39 consider that the best size is 1¼- or 1½-ton.
- 19 consider that the best size is 2-ton.
- 3 consider that the best size is over 2-ton.

Of 77 who now own 2-ton trucks—
- 1 considers that the best size is 1-ton.
- 5 consider that the best size is 1¼- or 1½-ton.
- 59 consider that the best size is 2-ton.
- 12 consider that the best size is over 2-ton.

Of 13 who now own 2½-ton and over—
- 2 consider that the best size is 2-ton.
- 11 consider that the best size is over 2-ton.

In all—
- 48 consider that the best size is ½-ton.
- 62 consider that the best size is ¾-ton.
- 329 consider that the best size is 1-ton.
- 113 consider that the best size is 1¼- or 1½-ton.
- 115 consider that the best size is 2-ton.
- 29 consider that the best size is over 2-ton.

There has evidently been a tendency on the part of some of these men to purchase trucks which experience has shown to be too small for their needs. While 444, or 64 per cent, prefer the size they now own, only 13 of the entire number prefer smaller sizes and 239 prefer larger sizes. However, the 1-ton size is preferred by nearly three times as many men as any other size, and only about 1 man in 25 prefers a truck of over 2 tons capacity.

ADVANTAGES AND DISADVANTAGES.

There are advantages in the ownership of a motor truck, but just how great these advantages are and which should be given the greatest weight are questions unanswerable by the man who has not had experience with a truck. A summary of the answers of 638 of these truck owners to the question "What is the principal advantage of a truck for farm use?" is given in Table II.

TABLE II.—*The "principal advantage" of a motor truck as reported by 638 farmers.*

Principal advantage.	Number reporting.	Per cent of total.
Time saved	577	91
Saves horses	19	3
Better market	15	2
Convenience	13	2
Reduces expense	9	1
Other	5	1
Total	638	.....

More than 90 per cent of the owners believe that time saving is the principal advantage. There are other advantages, of course, but in the minds of these farmers this is the principal one. While only 15 of the men report that the principal advantage of the truck is that it enables them to go to a better market, a much larger number are going to a better market now than before the purchase of their trucks. Going to a market which is farther from their farms is simply a matter of taking more time for marketing, and part of the men who say that saving of time is the principal advantage find that the truck saves them sufficient time to enable them to go to the better market.

The fact that such a small number consider the saving of horses, the reducing of expense, and added convenience as the principal advantages of the truck, indicates that the amount of time which the motor truck will save, which may incidentally result in reaching a better market, is the item which should be given paramount importance when considering the purchase of a motor truck.

Disadvantages of the motor truck were reported by 283 men. (See Table III.) Of the remaining 470 farmers 297 did not answer

the question and 173 stated that they knew of no disadvantages in owning a truck.

TABLE III.—*The "principal disadvantage" of a motor truck as reported by 283 farmers.*

Principal disadvantage.	Number reporting.	Per cent of total.
Poor roads	168	59
Cost of operation	48	17
Soft ground	25	9
First cost	15	5
Incompetent driver	14	5
Mechanical trouble	8	3
Other	5	2
Total	283	

It is seen that "poor roads" was given as the principal disadvantage by 59 per cent of those who reported on this item. A large percentage of the reports stated that there is some time during the year when the roads are in such a condition that motor trucks can not be used. (See page 18.) The men who live on unimproved roads, of course, have the greatest handicap in this respect, but even the best of roads may be impassable for a truck because of snow at certain times of the year in the region in which this study was made. After poor roads, either the cost of operation or soft ground is considered the greatest disadvantage, 17 per cent giving the cost of operation and 9 per cent soft ground as the greatest disadvantage. First cost is next in importance, 5 per cent considering it the most serious disadvantage, and troubles due to incompetent drivers and mechanical defects are considered prime disadvantages by 8 per cent of the owners.

ROAD HAULING WITH TRUCKS.

All materials hauled to and from the farms were divided into five general classes, viz, "Crops," "Milk," "Feed," "Fertilizer" (including lime and manure), and "Other." An idea of the relative amounts of these different classes of material hauled by the trucks may be obtained from the fact that 444 farms reported hauling a total of 52,977 tons of crops during the year; 100 reported hauling a total of 10,371 tons of milk; 96 reported hauling a total of 2,847 tons of feed; 118 reported hauling 6,487 tons of fertilizer; and 159 farmers reported hauling 14,599 tons of other material. The character of the crops to be hauled depends, of course, upon the type of farming practiced. All the crops raised on the different types of farms represented in this study are included.

Each farmer reported the size of load, length of haul, and the time required for the round trip with the truck. Similar information was given for hauling with wagons before the purchase of trucks. The

time required for the round trip included the time required for loading and unloading the truck or wagon.

Table IV shows a comparison of the size of load, length of haul, and time required for hauling crops with trucks of different sizes and with wagons.

TABLE IV.—*Time required to haul crops with trucks, and with wagons before purchase of trucks (567 reports).*

Size of truck.	With truck.				With wagon.			
	Size of load.	Distance.	Hours per round trip.	Hours per ton-mile.	Size of load.	Distance.	Hours per round trip.	Hours per ton-mile.
	Pounds.	*Miles.*			*Pounds.*	*Miles.*		
½-ton	960	10.4	2.5	0.50	1,505	9.0	7.2	1.06
¾-ton	1,851	12.9	3.2	.27	2,213	11.4	8.6	.68
1-ton	2,391	13.0	3.4	.22	2,582	10.4	8.3	.62
1¼- to 1½-ton	3,469	10.1	2.8	.16	3,306	9.2	7.3	.49
2-ton	4,928	13.6	3.6	.10	4,488	12.9	9.5	.34
Over 2-ton	8,125	21.1	6.0	.07	5,783	19.7	13.8	.24

Table V gives a like comparison for hauling milk, Table VI for hauling feed, and Table VII for hauling fertilizer.

TABLE V.—*Time required to haul milk with trucks, and with wagons before purchase of trucks (132 reports).*

Size of truck.	With truck.				With wagon.			
	Size of load.	Distance.	Hours per round trip.	Hours per ton-mile.	Size of load.	Distance.	Hours per round trip.	Hours per ton-mile.
	Pounds.	*Miles.*			*Pounds.*	*Miles.*		
½-ton	609	4.3	1.4	1.10	657	4.1	3.1	2.30
¾-ton	1,264	7.9	2.6	.52	1,332	8.4	5.0	.90
1-ton	1,301	5.1	1.6	.48	1,309	4.9	3.6	1.12

TABLE VI.—*Time required to haul feed with trucks, and with wagons before purchase of trucks (113 reports).*

Size of truck.	With truck.				With wagon.			
	Size of load.	Distance.	Hours per round trip.	Hours per ton-mile.	Size of load.	Distance.	Hours per round trip.	Hours per ton-mile.
	Pounds.	*Miles.*			*Pounds.*	*Miles.*		
½-ton	942	4.6	1.2	0.55	1,943	4.8	3.9	0.84
¾-ton	1,555	6.6	1.8	.35	2,331	7.4	6.7	.75
1-ton	2,407	6.8	1.9	.23	2,824	5.7	4.8	.60
1¼- to 1½-ton	3,214	5.6	1.8	.20	3,071	5.6	5.0	.59
2-ton	4,500	8.0	2.5	.14	3,300	7.8	7.0	.56

TABLE VII.—*Time required to haul fertilizer with trucks, and with wagons before purchase of trucks (121 reports).*

Size of truck.	With truck.				With wagon.			
	Size of load.	Distance.	Hours per round trip.	Hours per ton-mile.	Size of load.	Distance.	Hours per round trip.	Hours per ton-mile.
	Pounds.	*Miles.*			*Pounds.*	*Miles.*		
¾-ton	1,917	7.5	2.0	0.28	2,444	8.9	6.9	0.65
1-ton	2,444	7.3	2.3	.27	2,962	6.8	5.7	.56
1½- to 1½-ton	3,840	6.2	1.8	.15	3,681	6.1	4.5	.41
2-ton	5,281	7.2	2.2	.12	4,107	5.5	5.3	.47

It will be seen that the men who are using the smaller trucks hauled comparatively small loads with their wagons; however, the average size of loads of crops hauled with the ½-, ¾-, and 1-ton trucks is less than the average size of loads which were formerly hauled with wagons. The same is true with feed and fertilizer.

Milk was hauled almost entirely with 1-ton trucks or smaller, only 7 of 139 men who reported hauling milk having trucks larger than 1 ton. The size of load is smaller and the distance hauled is shorter for milk than for the other three materials. For each size of truck the average distance crops are hauled is slightly greater than the distance hauled with the wagons before the trucks were purchased, this difference being due to the fact that a number of men changed their markets after buying their trucks.

The hours per ton-mile were arrived at by dividing the hours for the round trip by the product of the distance in miles and size of load in tons. For instance, in Table IV the ½-ton truck carrying a load of 960 pounds a distance of 10.4 miles accomplishes 4.99 ton-miles of hauling. Since 2½ hours are required for making this trip the time required per ton-mile is 0.50 hour. A comparison of the hours required per ton-mile for hauling by truck with the hours per ton-mile required for hauling by horses and wagon gives the proportion of the time saved by using the truck.

TIME SAVED BY TRUCKS.

Table VIII shows the percentage of time which the trucks of different sizes are saving their owners in hauling different materials. In nearly every case the trucks are saving more than half of the time formerly required to haul with wagons.

TABLE VIII.—*Percentage of time which trucks of different sizes save in hauling different materials.*

Size of truck.	Time saved in hauling.			
	Crops.	Milk.	Feed.	Fertilizer.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
½-ton	53	52	35	.....
¾-ton	60	42	53	57
1-ton	65	57	62	52
1¼- to 1½-ton	67	.....	66	63
2-ton	71	.....	75	75
Over 2-ton	71	.....	.....	.....

If the men who own small trucks had hauled as large loads with wagons as the men with larger trucks did, the saving of time effected by the small trucks would have been much less. As shown in Table IV, the time per ton-mile required to haul crops with the ½-ton trucks is 0.50 hour, while the time required per ton-mile by these same men in hauling with wagons before the trucks were purchased was 1.06 hours, the trucks thus saving 53 per cent of the time. The men who now own 1¼- and 1½-ton trucks required only 0.49 hours per ton-mile for hauling with wagons before purchasing their trucks. This difference is due entirely to the fact that the men who now own ½-ton trucks formerly hauled loads with wagons which averaged 1,505 pounds, while the men owning 1¼- and 1½-ton trucks hauled loads which averaged 3,306 pounds.

RETURN LOADS.

The percentage of time which a truck is run without a load has a direct influence on the cost per unit of hauling with the truck. If a farmer can arrange to haul a load of produce to market and bring back a load of supplies to the farm on the same trip, he will reduce the time required and expense for hauling practically 50 per cent. (See fig. 2.) The reports of these men show that they have loads both ways for their trucks on an average of about 26 per cent of their trips. Thirty per cent of the men, however, stated that they never have return loads. The dairy farmers and general farmers reported return loads a considerably larger percentage of the time than did the fruit, truck, and crop farmers.

ROAD HAULING FOR WHICH TRUCKS ARE NOT USED.

A majority of these men still use their horses to supplement their trucks in hauling on the road. While 516 men reported concerning their present use of horses for road hauling, only 193, or 37 per cent, stated that they did all their road hauling during the year preceding the time of reporting with trucks. Table IX shows the reasons

given by the remaining 323 of these 516 men for using their horses on the road.

Nearly one-half gave "poor roads" as the reason for using horses; that is, they found it necessary to use their horses for hauling which had to be done at times when the condition of the roads was such that their trucks could not be used. A majority of the remainder stated that they used their horses either because the truck was too light for the load which it was desired to haul, or because the body was unsuitable for carrying the material. However, no farmer with a truck larger than the 1-ton size stated that he used horses because the truck was too light. About 7 per cent of the total number said that they used their horses to help out when the truck

FIG. 2.—A market gardener hauling manure to his farm on the return trip from market.

was busy, and about an equal number said that since they must keep their horses anyway they used them for some road hauling when they were not busy at other work.

It was not possible to determine from the reports the exact proportion of the road hauling which is still done with horses on these farms. However, on a large majority of them horses were used only for road hauling which it was necessary to do at times when the trucks could not be used or for which the trucks were not suitable, and such hauling would amount to only a small percentage of the total. The size of loads and distance hauled with horses are approximately the same as given in Tables IV to VII.

TABLE IX.—*Reason for using horses for hauling on the road.*

Reason for using horses.	Number reporting.	Per cent of total.
Poor roads	146	45
Truck body unsuitable	49	15
Truck too light	47	15
Keep horses busy	24	7
Truck busy	22	7
Soft ground	5	2
Reduce expense	4	1
Other	26	8

HAULING ON THE FARM WITH TRUCKS.

Of 416 men who reported on the use of their trucks for hauling on the farm, i. e., in the fields and around the buildings, 294, or more than 70 per cent, stated that they do not use their trucks at all for

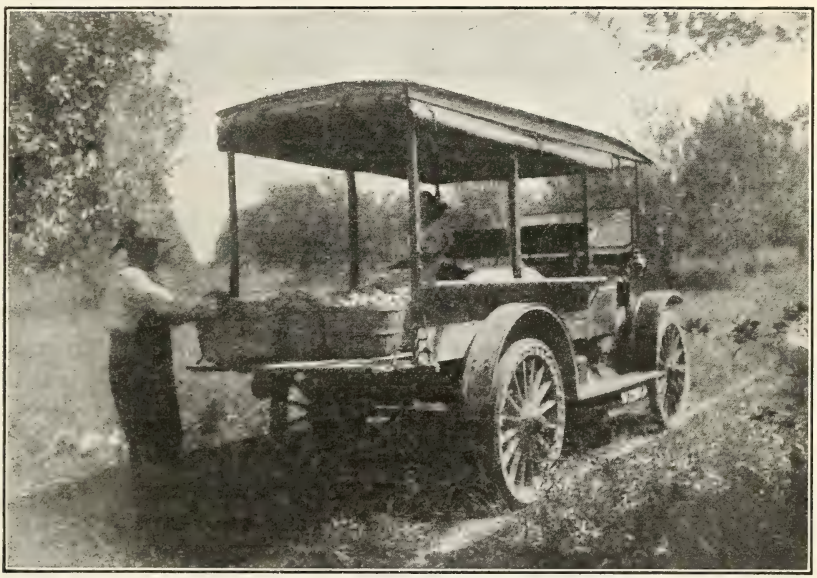

FIG. 3.—The truck can often be used to advantage for hauling fruit from the orchard to the packing house.

such work. The reasons for not using the truck for hauling on the farm were not given in every case, but a large number stated that their trucks were not suitable for such work. The smaller trucks in many cases will not carry as large loads as it is desired to haul, often the truck can not obtain traction in the fields, and sometimes the body with which it is equipped is not suitable for some of the hauling on the farm.

Many others stated that they used their horses for all hauling on the farm because there was no advantage in using the truck for such work. Most of the time required for hauling on the farm is taken up with loading and unloading, and the percentage of the total time

which will be saved by the truck when used for such work is small as compared with the time it will save in road hauling. When there are horses on the farm which would otherwise be idle, it would naturally be more profitable to use the horses and let the truck stand idle if there is no advantage in time saved or convenience in using it.

The reasons for using their trucks, as given by 122 men who reported that they did some hauling on their farms with their trucks, are summarized in Table X. Practically all of this hauling was either crops or fertilizer, including lime and manure. The average length of haul for 94 of these men who reported on hauling crops was 148 rods, and for 40 who reported hauling fertilizer it was 149 rods. The average size of all the farms included is only 173 acres (see Table I), and 149 rods is considerably greater than the average distance which crops and fertilizer are usually hauled on such farms.

TABLE X.—*Reason for using truck for hauling on the farm.*

Reason for using truck.	Number reporting.	Per cent of total.
Time saved	78	64
Convenience	22	18
Horses busy	13	11
Other	9	7

Sixty-four per cent of the 122 men reporting gave the saving of time as the reason for using their trucks for this work. A truck will save some time over horses on hauls of this distance if the truck body is suitable for carrying the material to be hauled, and if there is no difficulty in obtaining traction in the fields. It may also save time to use the truck when only one or two loads are to be hauled, and the horses and wagons are not ready for use.

Eighteen per cent reported that they used their trucks for hauling on their farms because it was more convenient than to use their horses. There is some hauling on the farms where frequent stops must be made, or where the horses or truck must be left without attention for a considerable length of time. In such cases it may be preferable to use the truck even though the horses are allowed to remain idle and the use of the truck does not save any time. (See fig. 3.)

The men who do use their trucks for hauling on the farm reported hauling only an average of 45 tons of crops and 37 tons of fertilizer per year (including lime and manure) with them, while the average amount of crops hauled to market per year with trucks for all farms is 119 tons, and the average amount of fertilizer hauled on the road with trucks is 55 tons per year. Thus, even the comparatively small number of men who use their trucks for hauling on the farm still use their horses for a goodly share of such work.

CUSTOM HAULING.

While all the men whose reports are included use their trucks primarily for hauling to and from their own farms, about 28 per cent reported that they did some custom work during the year preceding the time of reporting. Of 492 farmers who reported concerning custom work 355 said that during the past year they had done none whatever. The remaining 137 had received on the average $174 for such work. The number of men who reported hauling different materials, and the price which they received per ton-mile, are given in Table XI.

TABLE XI.—*Returns for custom work.*

Material.	Number of reports.	Price per ton-mile.
Crops	60	$0.37
Milk	6	.69
Feed	6	.39
Fertilizer	6	.28
Other	71	.48

About 30 per cent of these men who had done custom work stated that it had not been profitable. Many of them stated that the main reason for doing custom work was to accommodate their neighbors, and ordinarily in such cases the price was not high enough to make the work profitable. Most of the custom work reported was done by men owning large or medium sized trucks. Only seven of the men who own half-ton trucks reported that they did any custom work, and the average amount received by the seven for the work which they did during the past year was $53.

EFFECT OF DIFFERENT KINDS OF ROADS ON USE OF TRUCKS.

It has been shown that the majority of these farmers considered poor roads the greatest disadvantage in the use of a motor truck, and that most of those who still use horses for part of their road hauling do so because of poor roads. In order to gain a more definite idea of the effect of the kind of roads on the use of motor trucks, each farmer was asked to specify the kind of roads over which his truck traveled and the number of weeks during the past year the roads had been in such condition on account of mud or snow that the truck could not be used.

All kinds of roads, from unimproved dirt roads to high-class State highways, were reported. Twenty-nine per cent of the men who reported on this point stated that their trucks ordinarily travel only on dirt roads, 46 per cent stated that the roads which they ordinarily use are part dirt and part improved, and the remainder stated that they have all improved roads, either macadam, gravel, or better.

Of course, snow may make even the best of roads impassable for a truck, and this must be remembered in interpreting these figures.

The exact number of men with different kinds of roads and the number of weeks they could not use their trucks is as follows:

Of 187 men with dirt roads only—
- 17 were able to use their trucks every week in the year.
- 36 were unable to use them for 1 to 4 weeks in the year.
- 32 were unable to use them for 5 to 8 weeks in the year.
- 38 were unable to use them for 9 to 12 weeks in the year.
- 24 were unable to use them for 13 to 16 weeks in the year.
- 19 were unable to use them for 17 to 20 weeks in the year.
- 21 were unable to use them for 21 weeks and over.

Of 298 men with roads partly improved—
- 62 were able to use their trucks every week in the year.
- 68 were unable to use them for 1 to 4 weeks in the year.
- 59 were unable to use them for 5 to 8 weeks in the year.
- 43 were unable to use them for 9 to 12 weeks in the year.
- 30 were unable to use them for 13 to 16 weeks in the year.
- 20 were unable to use them for 17 to 20 weeks in the year.
- 16 were unable to use them for 21 weeks and over.

Of 159 men with improved roads only—
- 78 were able to use their trucks every week in the year.
- 38 were unable to use them for 1 to 4 weeks in the year.
- 19 were unable to use them for 5 to 8 weeks in the year.
- 16 were unable to use them for 9 to 12 weeks in the year.
- 5 were unable to use them for 13 to 16 weeks in the year.
- 1 was unable to use it for 17 to 20 weeks in the year.
- 2 were unable to use them for 21 weeks and over.

On the average, there were 10.7 weeks when the men with all-dirt roads could not use their trucks, 7.8 weeks when those with part-dirt roads could not use them, and 3.5 weeks when those with wholly improved roads could not.

In all, less than 25 per cent of the men found it possible to use their trucks every week in the year, and between 35 and 40 per cent reported that there were more than 8 weeks during the year when they could not use their trucks. About one-half of the men with wholly improved roads stated that they could use their trucks any time during the year, but only 9 per cent of those with all-dirt roads were able to do so, and there were more than 8 weeks during the year when 55 per cent of these men with all-dirt roads were unable to use their trucks. Snow was doubtless the main factor in making the roads impassable for the 81 men who have improved roads only, but who found there was at least one week during the year when they were not able to use their trucks.

The kind of tires with which the trucks are equipped apparently has little to do with the amount of time which they can not be used on account of the roads. That there was no apparent relation between the character of the roads and the different kinds of tires, and

no great difference in the length of time during which the condition of the roads prevented use of trucks with different kinds of tires, is shown by the following:

Of 222 owners of pneumatic-tired trucks—
69 have all-dirt roads.
96 have part-dirt roads.
57 have no dirt roads.
On the average there were 7.9 weeks during the year when the condition of the roads prohibited the use of the trucks.

Of 211 owners of solid-tired trucks—
47 have all-dirt roads.
98 have part-dirt roads.
66 have no dirt roads.
On the average there were 6.4 weeks during the year when the condition of the roads prohibited the use of the trucks.

Of 211 owners of trucks with pneumatic tires in front and solid tires behind—
71 have all-dirt roads.
104 have part-dirt roads.
36 have no dirt roads.
On the average there were 8.6 weeks during the year when the condition of the roads prohibited the use of the trucks.

Seven out of 69 men whose trucks are equipped with pneumatic tires and who have dirt roads only, and 4 out of 47 whose trucks are equipped with solid tires and who have dirt roads only, stated that there was less than a week during the year in which they could not use their trucks. The time during which the pneumatic-tired trucks with all-dirt roads could not be used was practically the same as for the solid-tired trucks with dirt roads only, the average being between 10 and 11 weeks in each case.

It does not necessarily follow that horses were always used for hauling when the roads were in such a condition that the trucks could not be used, as on at least a part of these farms there was no hauling which it was necessary to do at such times.

CHANGE OF MARKET.

Each truck owner was asked to give the name of the town where his produce was usually marketed before the purchase of the truck, and its distance from the farm. He was also asked to give the name of the town where the produce hauled by the truck is usually marketed and its distance from the farm. Answers of 704 men to these questions show that about one-fourth of them have changed their markets since purchasing their trucks. The exact number of men on each type of farm who answered the questions concerning their markets, the number who changed markets, and the average distance to the new markets is given in Table XII.

TABLE XIX.—*Change of market after purchase of motor trucks.*

Type of farming.	Number reporting.	Number who changed market.	Average distance to new market.
			Miles.
Truck	139	31	18
Dairy	119	18	16
Fruit	102	23	27
Crop	44	12	22
General	300	88	19
All	704	172	20

A somewhat smaller percentage of dairy farmers than of any other type changed their markets. When milk is hauled to a condensery or to a station for shipment it is not often that one market or station is enough better than another to warrant a change.

A large percentage of these men who have changed their markets stated that they did so because the new market was better than the old one. A few, however, stated that they changed for other reasons, several saying that the better roads between their farms and the markets they are now using were responsible for the change. It should be remembered that a considerable number of the men who have not changed their markets were using first-class markets before purchasing their trucks.

The fact that a man has changed his market does not necessarily mean that all his produce is hauled to the new market, or that he purchases all the material for his farm at the new market. In fact, a considerable number of these men who usually market their produce at a different place than before purchasing their trucks reported that they still haul some material either to or from the old markets.

The distances from 156 of these farms to the markets which they used before buying their trucks, and the distances to the markets which they are now using are as follows:

Of 64 men who formerly used markets 1 to 4 miles distant—
- 2 now use markets 1 to 4 miles distant.
- 17 now use markets 5 to 9 miles distant.
- 14 now use markets 10 to 14 miles distant.
- 15 now use markets 15 to 19 miles distant.
- 10 now use markets 20 to 24 miles distant.
- 3 now use markets 25 to 29 miles distant.
- 3 now use markets 30 or more miles distant.

Of 53 men who formerly used markets 5 to 9 miles distant—
- 7 now use markets 5 to 9 miles distant.
- 7 now use markets 10 to 14 miles distant.
- 7 now use markets 15 to 19 miles distant.
- 7 now use markets 20 to 24 miles distant
- 9 now use markets 25 to 29 miles distant.
- 16 now use markets 30 or more miles distant.

Of 26 men who formerly used markets 10 to 14 miles distant—
1 now uses market 5 to 9 miles distant.
4 now use markets 10 to 14 miles distant.
7 now use markets 15 to 19 miles distant.
2 now use markets 20 to 24 miles distant.
2 now use markets 25 to 29 miles distant.
10 now use markets 30 or more miles distant.
Of 8 men who formerly used markets 15 to 19 miles distant—
1 now uses market 5 to 9 miles distant.
2 now use markets 15 to 19 miles distant.
1 now uses market 20 to 24 miles distant.
2 now use markets 25 to 29 miles distant.
2 now use markets 30 or more miles distant.
Of 5 men who formerly used markets 20 or more miles distant—
1 now uses market 1 to 4 miles distant.
1 now uses market 20 to 24 miles distant.
3 now use markets 30 or more miles distant.

Before purchasing their trucks the operators of 75 per cent of these farms used markets less than 10 miles from their farms, but now over 80 per cent of them are using markets 10 miles or more from their farms. The average distance to the old market was 7 miles, and the average distance to the new market is 20 miles.

Seventy-one of these 156 men now use markets which are 20 miles or more from the farm. Of the entire 704 men who reported concerning their markets only 164 are now using markets which are 20 or more miles from the farm (see p. 6). Thus over 40 per cent of the men who now use markets which are such a great distance from their farms have changed markets since purchasing their trucks.

ANNUAL USE OF TRUCKS.

The number of miles per year which a motor truck travels has a direct bearing upon the cost per mile run or per ton hauled. Depreciation, interest, and repair charges appear all more or less independent of the number of miles which the truck travels per year, and the greater the number of miles traveled per year, or the greater the amount of material hauled, the less will be the charge per mile or per ton hauled for these items.

Following is a summary of the estimates of 553 men as to the number of miles per year which their trucks travel:

58, or 10 per cent, estimated the annual mileage at 1,250 or less.
118, or 22 per cent, estimated the annual mileage at 1,251 to 2,250.
115, or 21 per cent, estimated the annual mileage at 2,251 to 3,250.
92, or 17 per cent, estimated the annual mileage at 3,251 to 4,250.
66, or 12 per cent, estimated the annual mileage at 4,251 to 5,250.
34, or 6 per cent, estimated the annual mileage at 5,251 to 6,250.
19, or 3 per cent, estimated the annual mileage at 6,251 to 7,250.
19, or 3 per cent, estimated the annual mileage at 7,251 to 8,250.
7, or 1 per cent, estimated the annual mileage at 8,251 to 9,250.
14, or 3 per cent, estimated the annual mileage at 9,251 to 10,250.
11, or 2 per cent, estimated the annual mileage at 10,251 or more.

The average of the estimates of these 553 men is 3,820 miles, but 53 per cent of the estimates were 3,250 miles or less.

The amount of material hauled from and to the farm, which depends on the type of farming and the size of the farm; the size of load, which depends on the size of the truck; and the length of haul, all have an influence on the distance per year which a truck travels, but for the farms under consideration these factors are all corelated in such a way that no one of them exerts a predominating influence. For instance, the average of the estimates of the number of miles per year traveled by the trucks on the farms of different types is as follows:

	Miles.
108 truck farms	3,800
93 dairy farms	3,960
89 fruit farms	3,980
36 crop farms	3,240
227 general farms	3,800

Similarly, the size of the truck and the distance from the farm to market show very little relation to the number of miles traveled per year. The average of the estimates of—

113 men who own ½-ton trucks is 3,790 miles per year.
80 men who own ¾-ton trucks is 4,370 miles per year.
232 men who own 1-ton trucks is 3,660 miles per year.
52 men who own 1¼- and 1½-ton trucks is 3,100 miles per year.
60 men who own 2-ton trucks is 4,070 miles per year.
16 men who own 2½-ton and larger trucks is 4,980 miles per year.

These farmers were also asked for their estimate of the number of days per year on which they used their trucks—not the number of full days work per year which the truck did, but simply the number of days on which some use was made of it. The average of the estimates of the number of days per year on which some use is made of the trucks on farms of different types is shown in Table XIII. The dairy farmers use their trucks on the most days and the crop farmers on the fewest. The estimates also showed that in general the smaller trucks were used on a somewhat greater number of days than were the larger ones.

TABLE XIII.—*Days per year on which trucks are used.*

Type of farming.	Number of estimates.	Days per year on which truck is used.
Truck	133	160
Dairy	109	244
Fruit	99	159
Crop	43	127
General	255	162
All	639	173

LIFE AND DEPRECIATION OF TRUCKS.

The average first cost, average life, and average depreciation per year and per mile traveled for trucks of ½ to 2 tons in size are shown in Table XIV. There were so few reports on trucks over 2 tons in size that no figures for them have been included.

TABLE XIV.—*First cost, life, and depreciation charges for trucks of different sizes.*

[Italic figures in parentheses indicate number of reports for respective items.]

Size of truck.	½-ton.	¾-ton.	1-ton.	1½- and 1½-ton.	2-ton.
First cost	$574 (*149*)	$1,269 (*94*)	$900 (*342*)	$1,731 (*67*)	$2,366 (*9*)
Extra equipment	26 (*116*)	37 (*66*)	59 (*289*)	111 (*50*)	99 (*58*)
Total cost	600	1,306	959	1,842	2,465
Present age (years)	2.7 (*150*)	2.3 (*95*)	1.6 (*344*)	2.1 (*67*)	2.5 (*79*)
Remaining life (years)	3.9 (*94*)	4.8 (*56*)	4.7 (*196*)	5.1 (*40*)	5.4 (*48*)
Total life (years)	6.6	7.1	6.3	7.2	7.9
Annual depreciation	$91	$184	$152	$256	$312
Miles traveled per year	3,790 (*113*)	4,370 (*80*)	3,660 (*232*)	3,100 (*52*)	4,070 (*60*)
Depreciation per mile of travel	$0.024	$0.042	$0.041	$0.083	$0.077

The quoted price of the truck often does not include some equipment which it is necessary or desirable to have, and each man was asked to report not only the first cost of his truck, but also the cost of any extra equipment he had purchased for it. It was found that nearly 75 per cent of the men had bought some equipment which was not included in the quoted price. This extra equipment varied from minor attachments costing only $2 or $3 to bodies and cabs costing as much as $200 or $300. As shown in the table, the amount spent for this extra equipment has been added to the reported first cost to obtain the total cost.

In all, 7 men reported that they owned trailers for use with their motor trucks. However, the cost of these trailers was not included in the total cost of the trucks.

The total life of the trucks was figured by adding the present age (that is, the average number of years which the trucks had been owned) to the average of the estimates of the remaining number of years for which the trucks will give satisfactory service. The remaining life of the truck depends not only upon its present condition, but also upon the probable work it will do in the future, and the owner's idea as to when it will be cheaper to discard it and purchase a new one than to spend more time and money on it for repairs. There is quite a wide variation in the individual estimates on this item, but the average life as obtained in this manner gives the best available basis for figuring depreciation costs. The average life of all trucks as figured by this method was 6.7 years.

The annual depreciation was figured by dividing the first cost by the life in years, the depreciation per mile of travel by dividing the annual depreciation by the average number of miles traveled per year. A comparison of these figures with those for the cost of fuel and oil in Table XVI and for tires in Table XVII shows that for each size the depreciation charge is greater than the cost of fuel and oil, and for the larger sizes it is greater than the combined costs of fuel, oil, and tires.

REPAIRS.

Each truck owner was asked to report the amount he had spent for repairs since the purchase of his truck. A summary of the replies for trucks of different sizes is given in Table XV.

TABLE XV.—*Average repair costs of trucks of different sizes and ages.*

Present age (months owned).	Size of truck.				
	½-ton.	¾-ton.	1-ton.	1½- and 1½-ton.	2-ton.
	Average total expense for repairs.				
12 and less	$9	$20	$14	$2	$19
13 to 24	36	42	49	28	112
25 to 36	52	116	65	89	143
37 and over	136	191	155	127	444

In all, 40 per cent of the men who had not owned their trucks 12 months had spent nothing on them for repairs. However, very few of those who had owned their trucks for more than 12 months had been free from expense for repairs. The amounts which the owners of the trucks of different sizes had spent are as follows:

Half-ton trucks:

Of 20 men who had used their trucks 12 months or less—
- 7 had spent nothing for repairs.
- 13 had spent from $1 to $87.

Of 30 men who had used their trucks 13 to 24 months—
- 28 had spent from $1 to $87.
- 2 had spent from $88 to $187.

Of 41 men who had used their trucks 25 to 36 months—
- 1 had spent nothing for repairs.
- 30 had spent from $1 to $87.
- 9 had spent from $88 to $187.
- 1 had spent from $188 to $287.

Of 36 men who had used their trucks 37 months or more—
- 1 had spent nothing for repairs.
- 21 had spent from $1 to $87.
- 4 had spent from $88 to $187.
- 3 had spent from $188 to $287.
- 2 had spent from $288 to $387.
- 5 had spent $388 or more.

Three-fourths-ton trucks:

Of 18 men who had used their trucks 12 months or less—
- 7 had spent nothing for repairs.
- 11 had spent from $1 to $87.

Of 27 men who had used their trucks 13 to 24 months—
- 4 had spent nothing for repairs.
- 19 had spent from $1 to $87.
- 3 had spent from $88 to $187.
- 1 had spent from $288 to $387.

Of 25 men who had used their trucks 25 to 36 months—
- 3 had spent nothing for repairs.
- 12 had spent from $1 to $87.
- 4 had spent from $88 to $187.
- 3 had spent from $188 to $287.
- 2 had spent from $288 to $387.
- 1 had spent $388 or more.

Of 18 men who had used their trucks 37 months or more—
- 1 had spent nothing for repairs.
- 7 had spent from $1 to $87.
- 2 had spent from $88 to $187.
- 4 had spent from $188 to $287.
- 2 had spent from $288 to $387.
- 2 had spent $388 or more.

One-ton trucks:

Of 127 men who had used their trucks 12 months or less—
- 50 had spent nothing for repairs.
- 73 had spent from $1 to $87.
- 4 had spent from $88 to $187.

Of 134 men who had used their trucks 13 to 24 months—
- 15 had spent nothing for repairs.
- 96 had spent from $1 to $87.
- 13 had spent from $88 to $187.
- 7 had spent from $188 to $287.
- 3 had spent from $288 to $387.

Of 39 men who had used their trucks 25 to 36 months—
- 3 had spent nothing for repairs.
- 26 had spent from $1 to $87.
- 7 had spent from $88 to $187.
- 2 had spent from $188 to $287.
- 1 had spent $388 or more.

Of 25 men who had used their trucks 37 months or more—
- 12 had spent from $1 to $87.
- 6 had spent from $88 to $187.
- 1 had spent from $188 to $287.
- 4 had spent from $288 to $387.
- 2 had spent $388 or more.

Trucks of 1¼ to 1½ tons:

Of 10 men who had used their trucks 12 months or less—
- 8 had spent nothing for repairs.
- 2 had spent from $1 to $87.

Of 28 men who had used their trucks 13 to 24 months—
- 7 had spent nothing for repairs.
- 18 had spent from $1 to $88.
- 3 had spent from $88 to $187.

Trucks of 1¼ to 1½ tons—Continued.

Of 12 men who had used their trucks 25 to 36 months—
- 2 had spent nothing for repairs.
- 4 had spent from $1 to $87.
- 4 had spent from $88 to $187.
- 2 had spent from $188 to $287.

Of 11 men who had used their trucks 37 months or more—
- 5 had spent from $1 to $87.
- 4 had spent from $88 to $187.
- 1 had spent from $188 to $287.
- 1 had spent $388 or more.

Two-ton trucks:

Of 10 men who had used their trucks 12 months or less—
- 4 had spent nothing for repairs.
- 5 had spent from $1 to $87.
- 1 had spent from $88 to $187.

Of 23 men who had used their trucks 13 to 24 months—
- 3 had spent nothing for repairs.
- 13 had spent from $1 to $87.
- 2 had spent from $88 to $187.
- 2 had spent from $188 to $287.
- 3 had spent $388 or more.

Of 27 men who had used their trucks 25 to 36 months—
- 3 had spent nothing for repairs.
- 12 had spent from $1 to $87.
- 6 had spent from $88 to $187.
- 2 had spent from $188 to $287.
- 1 had spent from $288 to $387.
- 3 had spent $388 or more.

Of 11 men who had used their trucks 37 months or more—
- 3 had spent from $1 to $87.
- 1 had spent from $88 to $187.
- 7 had spent $388 or more.

The average age of the trucks which had been owned 37 months or more was not far from 4 years, and on this basis the average annual repair costs for the first 4 years of these trucks' lives were approximately $35 for the ½-ton trucks, $50 for the ¾-ton, $40 for the 1-ton, $35 for the 1¼-ton and 1½-ton, and $110 for the 2-ton. It is apparent that these figures are too low for the average annual repair cost for the entire life of the machines, but since none of the machines reported on were entirely worn out it is impossible to obtain accurate figures for this item. In the absence of accurate figures, allowances of $50 per year for the ½-ton trucks, $75 for the ¾-ton trucks, $75 for the 1-ton trucks, $100 for the 1¼-ton and 1½-ton trucks, and $150 for the 2-ton trucks, have been made as fair charges for the average annual repair costs in figuring the cost of operation in Table XX on page 32.

GASOLINE AND OIL.

The average number of miles obtained per gallon of gasoline and per quart of cylinder oil by the men who use trucks of different sizes

are shown in Table XVI. The average price which these men paid for gasoline at the time they made their reports (January and February, 1920), was 27 cents per gallon, and the average price of lubricating oil was 65 cents per gallon. The costs per mile traveled are computed from these figures. No attempt was made to learn the amount and value of the grease used, but in any case its value should be only a fraction of that of the lubricating oil.

TABLE XVI.—*Gasoline and oil requirements of trucks of different sizes.*

[Gasoline at 27 cents per gallon; lubricating oil at 65 cents per gallon.]

Size of truck.	Gasoline.			Oil.			Total cost per mile for gasoline and oil.
	Miles per gallon.	Number of reports.	Cost per mile.	Miles per quart.	Number of reports.	Cost per mile.	
½-ton	14.8	138	$0.018	59	93	$0.003	$0.021
¾-ton	12.1	92	.022	58	71	.003	.025
1-ton	11.2	332	.024	48	281	.003	.027
1¼ and 1½-ton	9.5	64	.028	49	54	.003	.031
2-ton	8.0	75	.034	40	62	.004	.038

TIRES.

Each man was asked to state what he paid for tires and the mileage obtained. The cost per mile for tires as shown in Table XVII is figured by simply dividing the average cost per tire by the average number of miles which the tire runs, and multiplying this result by four to obtain the cost for four tires. According to the estimates of 318 men, the pneumatic tires on these trucks run an average of 4,500 miles, and according to the estimates of 206 men the solid tires run an average of 8,200 miles. Such a large percentage of the ½-ton and ¾-ton trucks used are equipped with pneumatic tires that no figures for solid tire costs for these sizes are given, and such a large percentage of the trucks over 1 ton in size are equipped with solid tires that no figures for pneumatic tire costs for them are shown.

An allowance for the mileage obtained from the tires with which a machine is equipped when purchased must be made in order to determine the net tire cost to the user, as the cost of the first set of tires is included in the purchase price of the truck.

According to the estimates of these men the percentage of the total mileage of the trucks obtained from the tires with which they are equipped when purchased is as follows:

Pneumatic tires on the ½-ton trucks run 18 per cent of the total mileage.
Pneumatic tires on the ¾-ton trucks run 17 per cent of the total mileage.
Pneumatic tires on the 1-ton trucks run 19 per cent of the total mileage.
Solid tires on the 1-ton trucks run 36 per cent of the total mileage.
Solid tires on the 1¼- and 1½-ton trucks run 40 per cent of the total mileage.
Solid tires on the 2-ton trucks run 26 per cent of the total mileage.

The cost per mile as indicated by the cost of the tires and miles which they run has been reduced by these percentages in order to obtain the net cost per mile traveled. No attempt was made to obtain the cost of inner tubes for pneumatic tires or to obtain the cost of tire repairs separately from the entire repair costs of the trucks.

TABLE XVII.—*Tire costs.*

Size of truck.	Kind of tires.	Cost per mile.	Number of reports.	Allowance for tires on machine when bought.	Net cost per mile.
½-ton	Pneumatic	$0.020	113	$0.004	$0.016
¾-ton	do	.035	47	.006	.029
1-ton	do	.020	151	.004	.016
1-ton	Solid	.020	94	.007	.013
1½- and 1½-ton	do	.029	20	.012	.017
2-ton	do	.034	25	.009	.025

KIND OF TIRES RECOMMENDED BY USERS.

These truck owners were asked what kind of tires they consider the best for their conditions, regardless of the kind actually used. The kinds of tires which 637 men with trucks of all sizes are now using, together with the kinds they prefer, are as follows:

Of 231 men who use pneumatic tires—
230 prefer pneumatics.
1 prefers pneumatics in front and solids in rear.

Of 209 men who now use solid tires—
16 prefer pneumatics.
192 prefer solids.
1 prefers pneumatics in front and solids in rear.

Of 197 men who now use pneumatics in front and solids in rear—
75 prefer pneumatics.
67 prefer solids.
55 prefer pneumatics in front and solids in rear.

In all, 36 per cent now use pneumatics, 33 per cent use solids, and 31 per cent use pneumatics in front and solids in the rear, while 50 per cent prefer pneumatics, 41 per cent prefer solids, and only 9 per cent prefer pneumatics in front and solids in the rear. The kind of tires which a man prefers depends considerably upon the size of his truck and the kind of tires which he now uses. Four hundred and seventy-seven of these 637 men recommend the same kind of tire equipment as they are now using, and doubtless in a majority of these cases the kind of tires now used is the same as the kind with which the truck was equipped when it was purchased.

A large percentage of the owners of the ½- ton and ¾-ton trucks consider pneumatics the best; the owners of the 1-ton trucks are about evenly divided in their preference, and a large percentage of

the owners of trucks larger than 1 ton prefer solid tires. The exact number of owners of trucks of different sizes, and their recommendations, is as follows:

Of 135 owners of ½-ton trucks—
129 recommend pneumatics.
5 recommend solids.
1 recommends pneumatics in front and solids in the rear.
Of 92 owners of ¾-ton trucks—
64 recommend pneumatics.
25 recommend solids.
3 recommend pneumatics in front and solids in the rear.
Of 278 owners of 1-ton trucks—
111 recommend pneumatics.
120 recommend solids.
47 recommend pneumatics in front and solids in the rear.
Of 54 owners of 1¼- and 1½-ton trucks—
8 recommend pneumatics.
44 recommend solids.
2 recommend pneumatics in front and solids in the rear.
Of 65 owners of 2-ton trucks—
9 recommend pneumatics.
52 recommend solids.
4 recommend pneumatics in front and solids in the rear.
Of 13 owners of trucks over 2 tons in size, all recommend solids.

RELIABILITY.

The reliability of a motor truck, as that of any other machine, has a very decided effect upon its profitableness. If a truck is out of commission for several days at a time when its services are needed and when its owner is depending upon it to help him through a busy time it can scarcely be considered a profitable machine for him to own. Likewise, if a great deal of time is lost on the road on account of motor and tire trouble, breakage, and other delays, this loss and annoyance may overcome all the advantages attending its use. In order to obtain information as to the reliability of motor trucks for farm use these truck owners were asked to give both the number of days their trucks had been out of commission when needed during the past year, and the percentage of the time lost while using them. Table XVIII shows the average number of days 682 trucks of different ages were out of commission during the year preceding the time of reporting. The reports indicated that there is practically no difference in this respect among the trucks of different sizes.

TABLE XVIII.—*Days per year trucks were out of commission when needed.*

Age of trucks (months).	Total number of reports.	Average days out of commission.
12 and less	187	0.7
13 to 24	245	1.7
25 to 36	147	2.0
37 and over	103	3.2
All	682	1.7

The total number of days the trucks of different ages were out of commission is as follows:

Of the 187 which had been in use 12 months or less—
157 were out of commission no days.
23 were out of commission from 1 to 5 days.
5 were out of commission from 6 to 10 days.
2 were out of commission over 10 days.
Of the 245 which had been in use 13 to 24 months—
173 were out of commission no days.
44 were out of commission 1 to 5 days.
18 were out of commission 6 to 10 days.
10 were out of commission over 10 days.
Of the 147 which had been in use 25 to 36 months—
93 were out of commission no days.
39 were out of commission 1 to 5 days.
10 were out of commission 6 to 10 days.
5 were out of commission over 10 days.
Of the 103 which had been in use 37 months or more—
56 were out of commission no days.
32 were out of commission 1 to 5 days.
9 were out of commission 6 to 10 days.
6 were out of commission over 10 days.

Seventy-one per cent of the trucks had not been out of commission at all when needed, 20 per cent had been out of commission 5 days or less, 6 per cent had been out of commission from 6 to 10 days, and 3 per cent had been out of commission over 10 days. In general, the newer trucks are more reliable than the older ones. While nearly 85 per cent of the trucks which had been owned 12 months or less had not been out of commission when needed, only a little more than one-half of those which had been in use more than 3 years had not been out of commission during the preceding year.

The average percentage of time lost on account of motor and tire trouble, breakage, etc., by 542 men owning trucks of different ages is shown in Table XIX.

TABLE XIX.—*Per cent of time lost by trucks of different ages on account of motor and tire trouble, breakage, etc.*

Age of truck (months).	Number of reports.	Average per cent of time lost.
12 and less	155	0.6
13 to 24	190	1.1
25 to 36	120	1.6
37 and over	77	1.6

The estimates of the men who had used their trucks different lengths of time were as follows:

Of 155 who had used their trucks 12 months or less—
122 reported the loss of no time.
32 reported the loss of 1 to 5 per cent.
1 reported the loss of more than 10 per cent.
Of 190 who had owned their trucks 13 to 24 months—
130 reported the loss of no time.
52 reported the loss of 1 to 5 per cent.
7 reported the loss of 6 to 10 per cent.
1 reported the loss of more than 10 per cent.
Of 120 who had owned their trucks 25 to 36 months—
73 reported the loss of no time.
39 reported the loss of 1 to 5 per cent.
6 reported the loss of 6 to 10 per cent.
2 reported the loss of more than 10 per cent.
Of 77 who had owned their trucks 37 months or more—
39 reported the loss of no time.
34 reported the loss of 1 to 5 per cent.
3 reported the loss of 6 to 10 per cent.
1 reported the loss of more than 10 per cent.

The newer trucks are more reliable in this respect, just as they are in respect to the amount of time they are out of commission when needed. Eighty per cent of the men whose trucks have been in use 12 months or less stated that they lost no time, and only one-half of the men whose trucks have been in use more than 3 years stated that they had lost no time. In all, 67 per cent of the total stated that they had lost no time, and only 1 man in 26 stated that more than 5 per cent of the time was lost on this account.

The average distance crops are hauled by these men is about 10 miles, and the average time required for the round trip is not far from 3 hours (see Table IV). A loss of 5 per cent of the time on such a trip would mean a delay of about 10 minutes, and a loss of 10 per cent of the time would be a delay of about 20 minutes. Such delays, even with the trucks which give the most trouble in this respect would scarcely be as serious as the loss due to having the truck out of commission several days when it was needed.

To a certain extent the reliability of a motor truck depends upon the ability of the operator and the care which the truck is given.

Roughly, about 60 per cent of these trucks are operated by their owners, about 30 per cent by the sons of the owners, and about 10 per cent by hired men. Automobiles are owned on about three-fourths of the farms and tractors on about one-fourth of them. It is to be expected that the owner of such an expensive machine as a motor truck, or any member of his family, would give it a reasonable amount of care and operate it with a reasonable degree of intelligence, and the fact that automobiles or tractors were owned on a large percentage of these farms indicates that most of the operators were more or less skilled in the operation of gas engines. That such a large percentage of these trucks were operated without any loss of time and were always ready for work when needed is very probably partially due to these facts.

COST OF OPERATION.

The cost of operating trucks of different sizes reported by these men is shown in Table XX. The items considered in making up these costs are depreciation, repairs, interest on investment, registration and license fees, cost of gasoline and oil, and of tires.

TABLE XX.—*Cost of operating trucks of different sizes.*

	Size.				
	½-ton.	¾-ton.	1-ton.	1½- and 1½-ton.	2-ton.
Fixed charges:					
Annual depreciation	$91	$184	$152	$256	$312
Annual repairs	50	75	75	100	150
Annual interest	21	45	33	63	83
Annual registration and license fees	10	15	18	22	26
Total fixed charges	172	319	278	441	571
Miles traveled per year	3,790	4,370	3,660	3,100	4,070
Fixed charges per mile	$0.045	$0.073	$0.076	$0.142	$0.140
Gasoline and oil per mile	.021	.025	.027	.031	.038
Tires per mile	.016	.029	.016	.017	.025
Total cost per mile	.082	.127	.119	.190	.203

The figures for annual depreciation are obtained from Table XIV; those for annual repairs are obtained from page 26.

Interest is figured at 6 per cent on the average investment. The average investment has been found by the rule: Average investment = first cost $\times \frac{\text{years of service} + 1}{\text{years of service} \times 2}$. This is the generally accepted method for determining the average investment in equipment where a fraction of the first cost is charged off each year for depreciation. The interest charge when computed on this basis is slightly greater than when computed on one-half of the first cost.

Registration and license fees vary considerably in the different States. No attempt was made to determine the exact average of the fees paid by the different men. The amounts used as shown in the table are, however, representative of such fees for the year 1920 in the Eastern States, and include both the registration of the truck and the operator's license. In nearly every instance these amounts are within $5 of the actual fees charged in the different States.

No charge has been made for taxes, insurance, housing, or labor spent in caring for the truck. However, these items would ordinarily amount to a very small percentage of the total cost.

The number of miles traveled per year are shown on page 22. The gasoline and oil charges are obtained from Table XVI, and the tire charges from Table XVII. The tire charges for the ½-ton, ¾-ton, and 1-ton trucks are for pneumatic tires, while for the 1¼-ton, 1½-ton, and 2-ton trucks the tire charges are for solid tires.

COST OF HAULING WITH TRUCKS.

The cost of hauling with a motor truck is determined by the cost of operating the truck, the charge for the driver's time and labor, the size of load hauled, and the percentage of time the truck runs without a load. In Table XXI are given the cost per mile of haul, and the cost per ton-mile of hauling crops with trucks of different sizes. The cost of operating the truck is taken directly from the preceding table. The charge for the driver is obtained by allowing a rate of 50 cents per hour for his time while driving and while loading and unloading the truck. The average time required for hauling different materials as given in Tables IV to VII is 0.14 hour per mile of travel for the ½- and ¾-ton trucks, and 0.15 hour for the 1-, 1¼-, 1½-, and 2-ton trucks.

It is stated on page 13 that these men had return loads for their trucks about 26 per cent of the time; that is, each truck hauls loads both ways on 26 out of every 100 round trips it makes from and to the farm, and runs without a load 74 one-way trips. The cost of operating the truck and the value of the driver's time for these 74 trips with no load must be charged to the 126 trips with loads, in order to obtain the actual cost per mile of haul. That is, every 126 miles of haul must bear the expense of 200 miles of travel, or every 63 miles of haul must bear the expense of 100 miles of travel. The cost per mile of haul as given in the table is obtained by multiplying the total cost per mile traveled by 100 and dividing the product by 63.

The cost per ton-mile hauled is determined by dividing the cost per mile hauled by the weight of the load in tons. As shown in Table IV, the average weight of a load of crops hauled with ½-ton trucks is

0.480 ton; for ¾-ton trucks the load is 0.926 ton; for the 1-ton trucks, 1.196 tons; for 1¼-ton and 1½-ton trucks, 1.734 tons; and for the 2-ton trucks, 2.464 tons. The costs per mile of haul for the trucks of different sizes divided by these figures give the costs per ton-mile.

TABLE XXI.—*Cost of hauling with trucks of different sizes.*

Size of truck.	½-ton.	¾-ton.	1-ton.	1¼- and 1½-ton.	2-ton.
Truck cost per mile run	$0.082	$0.127	$0.119	$0.190	$0.203
Charge for driver per mile run	.070	.070	.075	.075	.075
Total	.152	.197	.194	.265	.278
Cost per mile of haul (37 per cent idle running)	.241	.313	.308	.421	.441
Cost per ton-mile for hauling crops	.502	.338	.258	.242	.179

SAVING OF HIRED HELP.

The saving of time is given by these men as the greatest advantage in the use of a motor truck, but the saving of time will not be of any financial benefit to a farmer unless he uses the time thus saved on other work, or unless it enables him to reduce the expense for hired help.

These men were asked whether or not their trucks reduce the expense for hired help, either man or horse, and, if so, to estimate the amount thus saved per year. Of 711 men who answered the question as to whether the truck reduces the expense for hired help, 562, or 79 per cent, said that it does, and the remaining 149 that it does not.

Three hundred and fifty of the 562 estimated the amount thus annually saved, and the average of these estimates is $324. This figure can scarcely be taken to represent the actual amount which the labor bills of these men have been reduced since purchasing their trucks, but rather as their estimates of the amounts by which their bills would be increased if they did not now own trucks, and if they were doing the same amount of work they are now doing.

Eighty-four per cent of the operators of fruit farms think that their trucks reduce the expense for hired help. This is a slightly higher percentage than is reported for any other type of farming. The average of the estimates of those of this 84 per cent who attempted to place a value on the amount of help saved is $364.

The owners of the larger trucks make higher estimates of the amount that their trucks reduce expenses than do owners of the smaller ones. The averages of the estimates of the owners of the ½-ton, ¾-ton, and 1-ton trucks, who report that their trucks reduce the bill for hired help, were all between $250 and $300, the average of the estimates of the owners of the 1¼-ton and 1½-ton trucks was

between $375 and $400, while the estimates of the owners of the 2-ton trucks and of those over 2 tons averaged more than $600. There is no great difference in the percentages of the owners of the different sizes who consider that their trucks do not reduce the expense for hired help.

DISPLACEMENT OF HORSES.

The operators of 610 farms reported the number of head of work stock they owned before purchasing their trucks and the number they had disposed of since that time. Four of these 610 farms were small ones which had been operated without horses even before trucks were purchased. The number of head of work stock kept on the other 606 farms varied from 1 or 2 on the smaller farms to 20 and more on a few of the larger ones. The total number of work stock kept on the 606 farms was 3,103. On 296 of them the number had been reduced since the trucks were purchased by a total of 586 head, an average reduction of 19 per cent for the 606 farms and an average displacement of 1.0 head per truck.

A man with only 1 or 2 horses will usually need to keep them for work on the farm even after buying a truck, and only about 1 man in 7 who owned 1 or 2 horses had sold any since buying his truck. Similarly, the purchase of a motor truck will not often enable a man who owns 3 or 4 horses, all of which he sometimes uses as a single unit, to reduce the number of his work stock. A little less than one-half of the men who had owned 3 or 4 horses before purchasing their trucks reported that they had disposed of any since that time, but nearly two-thirds of those who had owned 5 or more had disposed of at least 1 after purchasing the truck. The exact number of work stock formerly owned and the number disposed of by the different men is as follows:

Of 90 men who owned 1 or 2 head before purchasing trucks—
- 77 had disposed of none.
- 10 had disposed of 1.
- 3 had disposed of 2.

Of 232 men who owned 3 or 4 head before purchasing trucks—
- 130 had disposed of none.
- 59 had disposed of 1.
- 42 had disposed of 2.
- 1 had disposed of 3.

Of 156 men who owned 5 or 6 head before purchasing trucks—
- 66 had disposed of none.
- 35 had disposed of 1.
- 43 had disposed of 2.
- 8 had disposed of 3.
- 4 had disposed of 4.

Of 63 men who owned 7 or 8 head before purchasing trucks—
16 had disposed of none.
7 had disposed of 1.
25 had disposed of 2.
5 had disposed of 3.
10 had disposed of 4.
Of 34 men who owned 9 or 10 head before purchasing trucks—
8 had disposed of none.
1 had disposed of 1.
10 had disposed of 2.
4 had disposed of 3.
5 had disposed of 4.
6 had disposed of 5 or more.
Of 31 men who owned 11 or more head before purchasing trucks—
13 had disposed of none.
2 had disposed of 1.
4 had disposed of 2.
3 had disposed of 3.
3 had disposed of 4.
6 had disposed of 5 or more.

This displacement of horses by motor trucks is quite comparable to the displacement by tractors in this section. A study of 252 New York farms on which tractors are owned, as reported in Farmers' Bulletin 1004, "The Gas Tractor in Eastern Farming," showed that on these farms the total work stock owned when the tractors were purchased amounted to 1,321, while the total after the purchase of tractors was 1,018, a reduction of 22 per cent, and an average displacement of 1.2 head per tractor.

FARMS ON WHICH TRACTORS ARE OWNED.

Of 675 men who reported on whether or not they own tractors, 180, or 27 per cent, stated that they own tractors. Tractors are owned on a larger percentage of the crop and fruit farms than on farms of other types. They are owned on 9 per cent of the truck farms, 33 per cent of the dairy farms, 38 per cent of the fruit farms, 42 per cent of the crop farms, and 25 per cent of the general farms. Size of the farm, however, evidently had a greater influence in this regard than did the type of farming. The number of men with farms of different sizes (*crop* acres, not *total* acres), who do and do not own tractors, is as follows:

Of 243 men with 60 or less crop-acres—
21 own tractors.
222 do not own tractors.
Of 227 men with 61 to 120 crop-acres—
47 own tractors.
180 do not own tractors.
Of 103 men with 121 to 180 crop-acres—
42 own tractors.
61 do not own tractors.

Of 45 men with 181 to 240 crop-acres—
31 own tractors.
14 do not own tractors.
Of 30 men with 241 to 300 crop-acres—
20 own tractors.
10 do not own tractors.
Of 27 men with 301 or more crop-acres—
19 own tractors.
8 do not own tractors.

Over two-thirds of the 675 farms consisted of not over 120 crop-acres. Tractors are owned on only about 15 per cent of such farms, while they are owned on 55 per cent of those with more than 120 crop-acres. In most cases the reports did not show the size of the tractor owned, but at least a part of the tractors owned on the 21 farms with 60 or less crop-acres are small ones of only one or two draw-bar horsepower, and are capable of doing the work of only about one horse.

The ownership of both motor trucks and tractors, even on the large farms, has not resulted in a very great reduction in the number of horses. The men who own both trucks and tractors and who have from 61 to 120 crop-acres still keep nearly 4 horses on the average—one horse for each 24 crop-acres—and only 6 of them are farming with fewer than 3 horses. The men who have from 121 to 180 crop-acres still keep an average of 5 horses—one for each 30 acres—and only six of them are now farming with fewer than 4 horses. The men who have over 180 crop-acres still keep an average of between 8 and 9 horses—one to each 39 crop-acres—and only 3 of them are farming with fewer than 4 horses.

The number of crop-acres per horse on the farms of different sizes where trucks are owned, but not tractors, is only about 2 acres less in each case than on the farms where tractors are owned, there being 22 crop-acres per horse on the farms with 61 to 120 crop-acres where tractors are not owned, 28 per horse on those with 121 to 180 crop-acres, and 37 per horse on those with over 180 crop-acres.

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BULLETIN No. 910

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H. C. TAYLOR, Chief

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EXPERIENCE OF EASTERN FARMERS WITH MOTOR TRUCKS.

An Analysis of 753 Reports from Farmer Truck-Owners.

By H. R. Tolley, *Scientific Assistant*, and L. M. Church, *Assistant in Farm Accounting.*

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SUMMARY.

This bulletin is based on the experience with motor trucks of 753 farmers in the States of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, and Maryland who have motor trucks for use on their own farms.

These farms are of all sizes and types, and the motor trucks used on them are of all sizes from ½ ton to 5 tons. The rated capacity of very few of the trucks is over 2 tons, however, and nearly half are of the 1-ton size.

Only 18 per cent of these farms are less than 5 miles from market, and nearly one-fourth are 20 miles or more from market.

Ninety-five per cent of these men believe that their trucks will prove to be profitable investments.

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One-ton trucks are preferred by more of them than prefer any other size. About half of the owners of ½- and ¾-ton trucks prefer sizes larger than they now own.

In the opinions of these men the principal advantage of a motor truck is in saving time, and the principal disadvantage is "poor roads."

As compared with horses and wagons, the trucks save from half to two-thirds of the time required for hauling materials to and from the farms.

These men have return loads for their trucks on about one-fourth of the trips.

A majority still use their horses for some road hauling.

On most of the farms all the hauling in the fields and around the buildings is done with horses and wagons.

About one-fourth of these men do some custom hauling with their trucks. The average amount received per year by those who do such work is $174.

On the average there are about eight weeks during the year when the roads are in such condition on account of mud, snow, etc., that the trucks can not be used. Three-fourths of them usually travel on roads that are all or part dirt.

About one-fourth of the men have changed their markets, for at least a part of their produce, since purchasing trucks. For those who have changed market, the average distance to the old market is 7 miles, and the average distance to the new market is 20 miles.

According to owners' estimates, each of these trucks travels an average of 3,820 miles per year and is used on 173 days per year.

The average estimated life of the trucks is between 6½ and 7 years, and, in most cases, depreciation is the largest single item of expense.

Most of the owners of the ½-ton and ¾-ton trucks prefer pneumatic tires, the owners of the 1-ton trucks are about evenly divided in their preference, but most of the owners of trucks larger than 1 ton prefer solid tires.

Over two-thirds of these trucks had not been out of commission, when needed, for a single day during the year covered by the reports, and nearly the same proportion of the owners stated that they had not lost any appreciable time on account of motor and tire trouble, breakage, etc., when using their trucks. However, about one truck in thirty had been out of commission 10 days or more.

The average cost of operation of the ½-ton trucks was about 8 cents per mile; of the ¾-ton trucks about 13 cents; of the 1-ton about 12 cents; of the 1¼-ton and 1½-ton about 19 cents, and of the 2-ton about 20 cents.

The average cost of hauling crops, including the value of the driver's time at 50 cents an hour, was about 50 cents per ton-mile with the